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## Two New Species of *Secamone* (Apocynaceae, Secamoneae) from Madagascar

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**ABSTRACT.** *Secamone schatzii* and *S. linearis* are two new species of Apocynaceae, Secamoneae, from the Malagasy eastern lowland forest and from the Marojejy mountains in northeastern Madagascar, respectively. Both species are related to *Secamone tenuifolia* and *S. glaberrima* from the Central Plateau. The new species are described, illustrated, and compared with related taxa. A key to the eight species in the *Secamone tenuifolia* group is given.

*Secamone* R. Brown is a paleotropical genus of suffrutescent twiners or small scrambling herbs, rarely erect shrubs, with usually small white to yellow flowers. In a revision of *Secamone* in the Madagascar Region (Klackenberg, 1992), 56 species were recognized from Madagascar. Since then two additional species have been described from this island (Klackenberg, 1997, 1998). In the course of preparing the tribe Secamoneae for the *Flore de Madagascar et des Comores*, while examining recent material from the MO herbarium, I encountered two specimens from eastern Madagascar that do not fit in any of the hitherto known 58 species. The specimens were collected in the lowland at Nosy Mangabe and in the mountains in Marojejy, respectively. After morphological analysis it is evident that they represent two new species of *Secamone*. Both are herein described, illustrated, and given the names *Secamone schatzii* and *S. linearis*.

Both *Secamone schatzii* and *S. linearis* resemble *S. tenuifolia* Decaisne and *S. glaberrima* Schumann, two rather common species known from the Central Plateau. *Secamone tenuifolia* and *S. glaberrima* constitute, together with *S. dequairei* Klackenberg, *S. drepanoloba* Klackenberg, *S. sparsiflora* Klackenberg, and *S. unciformis* Klackenberg, a group of taxa characterized by having usually thick valvate corolla lobes that are finely tuberculate on their inner side. The staminal corona lobes are also usually tuberculate toward the base. The majority of the hitherto described species in this group further display a tuberculate lower leaf epidermis. However, this is a character absent in *Secamone glaberrima*, *S. sparsiflora*, and *S. un-*

*ciformis*, as well as in the two new species *S. schatzii* and *S. linearis*.

In addition to the smooth lower leaf epidermis, *Secamone schatzii* and *S. linearis* have a leaf shape and venation similar to that of *S. glaberrima* and *S. sparsiflora*, respectively. Both *S. glaberrima* and *S. schatzii* are distinguished by mostly elliptic leaf laminae revealing only the midrib when dry, and by having strongly dorsiventrally flattened staminal corona lobes. In contrast, *Secamone sparsiflora* and *S. linearis* have narrow, mostly linear leaves, also with only the midrib visible when dry.

***Secamone schatzii* Klackenberg, sp. nov.** TYPE: Madagascar. Toamasina, Nosy Mangabe in the Bay of Antongila, 5 km S of Maroanetra, 15°30'S, 49°46'E, 0–330 m, 2–19 Jan. 1990, G. E. Schatz & E. Carlson 2941 (holotype, MO; isotypes, TAN not seen, WAG). Figure 1.

Species haec *Secamonae glaberrimae* similis foliis ellipticis subtus non tuberculatisque et lobis coronae dorsiventraliter applanatis, sed corollae lobis in aestivatione parum imbricatis et intra non subtiliter tuberculatis autem epidermide laevi vel coronae lobis brevioribus differt.

Liana with terete glabrous stems. Leaves opposite, herbaceous, entire, flat but at least when dry slightly revolute at the very margin, glabrous; blade ca. 4–6 × 1.5–2 cm, elliptic, cuneate at the base, acute at the apex; venation not visible except for the midrib when dry; midrib ± even with the leaf surface on both sides; epidermis smooth on both sides; petiole ca. 5 mm long. Inflorescences axillary or terminal, shorter than the adjacent leaves; cymes mostly dichasial, rather lax and with few flowers; axes ca. 5–10 mm long, mostly glabrous; pedicels 3–5 mm long; bracts 0.5–1.0 mm long, ciliate. Flowers pentamerous, actinomorphic. Calyx lobes only shortly connate, ca. 0.9–1.0 × 0.9 mm, almost orbiculate to broadly ovate, rounded at the apex, externally glabrous but ciliate, internally pubescent at base with a small gland (colleter) in each sinus. Corolla ellipsoid in bud and rounded at the apex, somewhat contorted with the left margins slightly overlapping, not twisted, fused for ca. 1/2 of its



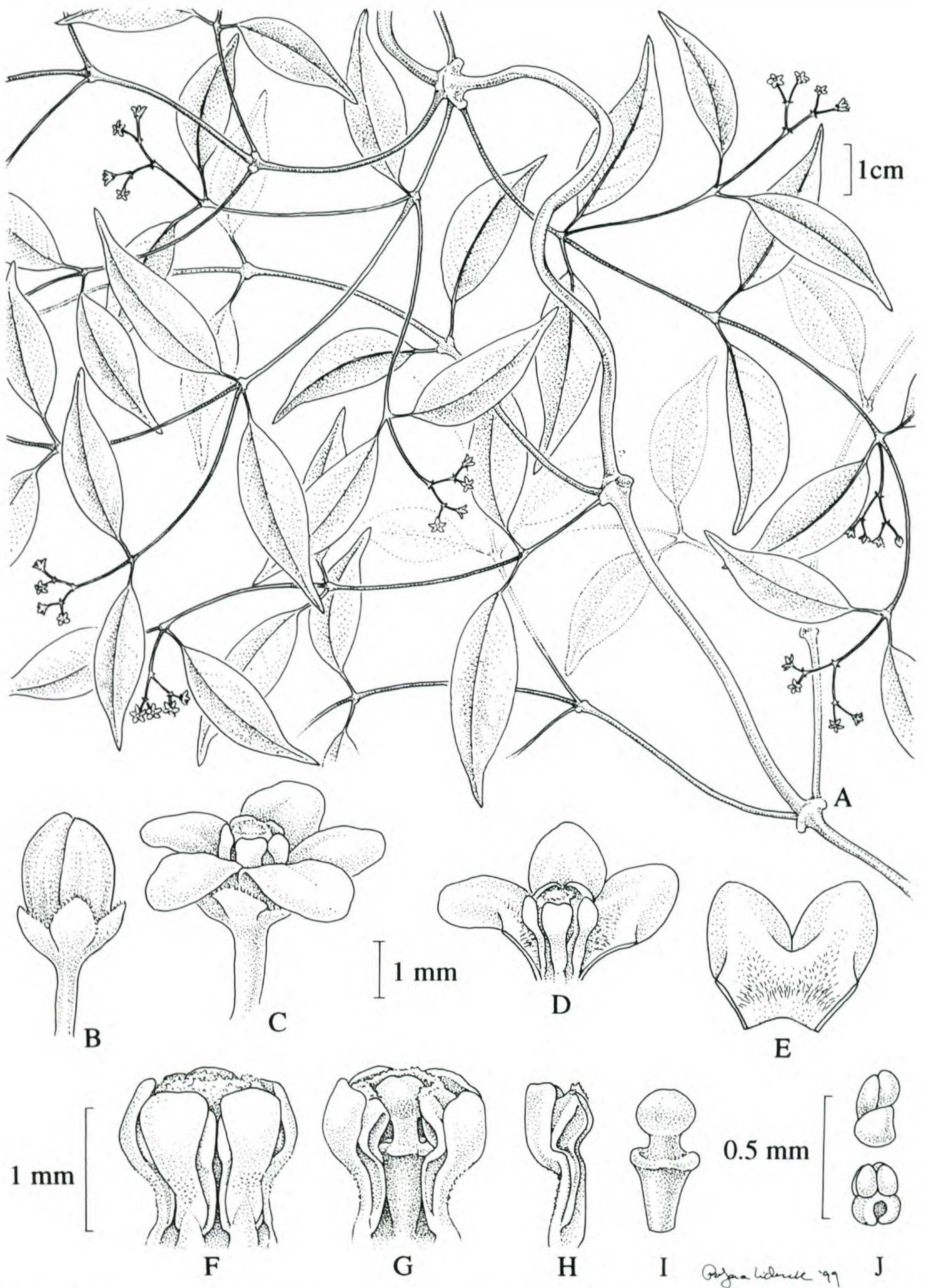


Figure 1. *Secamone schatzii* Klackenberg. —A. Habit. —B. Flower in bud. —C. Flower. —D. Gynostegium and portion of corolla. —E. Portion of corolla from within. —F. Gynostegium. —G. Gynostegium with one anther removed. —H. Anther, lateral side. —I. Style head. —J. Pollinarium, lateral side (top) and axial side. A–J, Schatz & Carlson 2941. Drawn by Pollyanna Lidmark, Stockholm.



length into a tube, hairy in the mouth, yellow-orange; tube ca. 1.3 mm long; lobes curved outward to almost rotate, ca.  $1.3 \times 1.5$  mm, oblong to broadly ovate, obtuse at the apex, smooth. Corolline corona present in form of an epipetalous bilobed cushion in each lobe sinus. Staminal column ca. 1.2 mm high; connective produced into a membranous tip; filaments with horny margins (pollinium collectors) to the base. Staminal corona lobes ca. 0.7 mm long, dorsiventrally compressed and flat, about as long as the staminal column, somewhat arched, truncate at the apex; basal portion  $\pm$  flat and finely papillate near the base, narrower than the lobe, attached from base along slightly more than half of the stamen. Pollinia minute, 2 in each anther loculus,  $\pm$  ascending, ellipsoidal, 0.15–0.2 mm long. Ovary of two separate carpels, subinferior. Style absent. Style head  $\pm$  equaling the staminal column; narrower upper part about as long as the lower broader part, ca. 0.6 mm long, slightly broadened at the apex. Fruits not seen.

*Distribution and habitat.* *Secamone schatzii* is only known from the type collection from Nosy Mangabe in the Bay of Antongila on the east coast of Madagascar. It was climbing to 16 m above ground into the canopy. It was collected in flower in January.

*Secamone schatzii* is known from low altitudes in the eastern rainforest zone, in contrast to *S. glaberrima*, which is generally distributed on the Central Plateau of Madagascar. Although similar in habit and in gross flower morphology, *Secamone schatzii* differs from *S. glaberrima* by its smooth (vs. papillate-tuberculate) inner surfaces of the corolla lobes, by having a ring of relatively short hairs in the corolla tube (vs. five distinct triangular patches of long retrorse hairs), by having the corona lobes more or less equaling the staminal column (vs. distinctly longer), and by the stigma head, which has subequal lower and upper portions (vs. twice as long lower portions). In addition, the corolla lobes of *S. schatzii* thin toward the margins. These margins further slightly overlap to the left when externally viewed. In contrast, *S. glaberrima*, *S. sparsiflora*, and *S. tenuifolia* all share corolla lobes that are more or less evenly thick to the margin in a distinctly valvate arrangement.

This species is named after George Schatz, Missouri Botanical Garden, who collected the only known material of this species during one of several inventory trips to Nosy Mangabe.

***Secamone linearis*** Klackenberg, sp. nov. TYPE: Madagascar. Antsiranana, Réserve Naturelle Intégrale 12, Marojejy, au Nord d'Andapa, aux environs du sommet de l'Est, 14°29'S, 49°38'E, 1300–1500 m, 21–22 Jan. 1994, *F. Rasoavimbahoaka et al. 14* (holotype, MO; isotypes, S, TAN not seen). Figure 2.

Species haec *Secamonae tenuiflorae* et *S. sparsiflorae* similis foliis plus minusve linearibus et lobis corollae intra subtiliter tuberculatis; ab illa foliis subter non tuberculatis, a hac pedicellis brevioribus et habitu volubili, et a coronae duabus lobis distincte dorsiventraliter applanatis et corollae lobis non distincte valvatis autem parum imbricatis differt.

Liana with terete glabrous stems. Leaves opposite, herbaceous, entire, flat but at least when dry slightly revolute at the very margin; blade ca.  $20\text{--}30 \times 1\text{--}3$  mm, linear to rarely narrowly ovate, attenuate at the base, acute to acuminate at the apex, glabrous; venation not visible except for the midrib when dry; midrib  $\pm$  even with leaf surface above,  $\pm$  even with leaf surface or slightly raised below; epidermis smooth on both sides; petiole ca. 1 mm long, sometimes with reddish hairs. Inflorescences axillary (sometimes appearing terminal), much shorter than the adjacent leaves; cymes di- to monochasial, rather dense with up to ca. 8 flowers; axes up to 5 mm long, covered with few reddish hairs, often more densely hairy along one or two sides; pedicels up to 1.5 mm long, usually hairy; bracts 0.5–1.0 mm long, usually broad, triangular. Flowers pentamerous, actinomorphic. Calyx lobes only shortly connate, ca.  $0.6 \times 0.9$  mm, ovate, acute at the apex, glabrous outside but ciliate, hairy inside and with a broad gland (colleter) in each sinus. Corolla ellipsoid in bud and rounded at the apex, seemingly valvate but actually contorted with left margins slightly overlapping, not twisted, somewhat campanulate, fused for ca. 3/5 of its length into a tube, with long retrorse hairs in filled triangles below the mouth inside, white; tube ca. 1.3–1.9 mm long; lobes curved outward, ca.  $1.9 \times 1.3$  mm, triangular,  $\pm$  acute at the apex, thick, finely papillate inside, smooth outside. Corolline corona present in the form of an epipetalous bilobed cushion in each lobe sinus. Staminal column ca. 1.3 mm high; connective produced into a membranous tip; filaments with horny margins (pollinium collectors) to the base. Staminal corona lobes ca. 0.6 mm long, dorsiventrally compressed and flat, slightly longer than the staminal column, somewhat arched, truncate at the apex; basal portion  $\pm$  flat, smooth, almost as broad as the lobe, attached from base along slightly more than half of the stamen. Pollinia minute, 2 in each anther-loculus,  $\pm$  ascending, ellip-



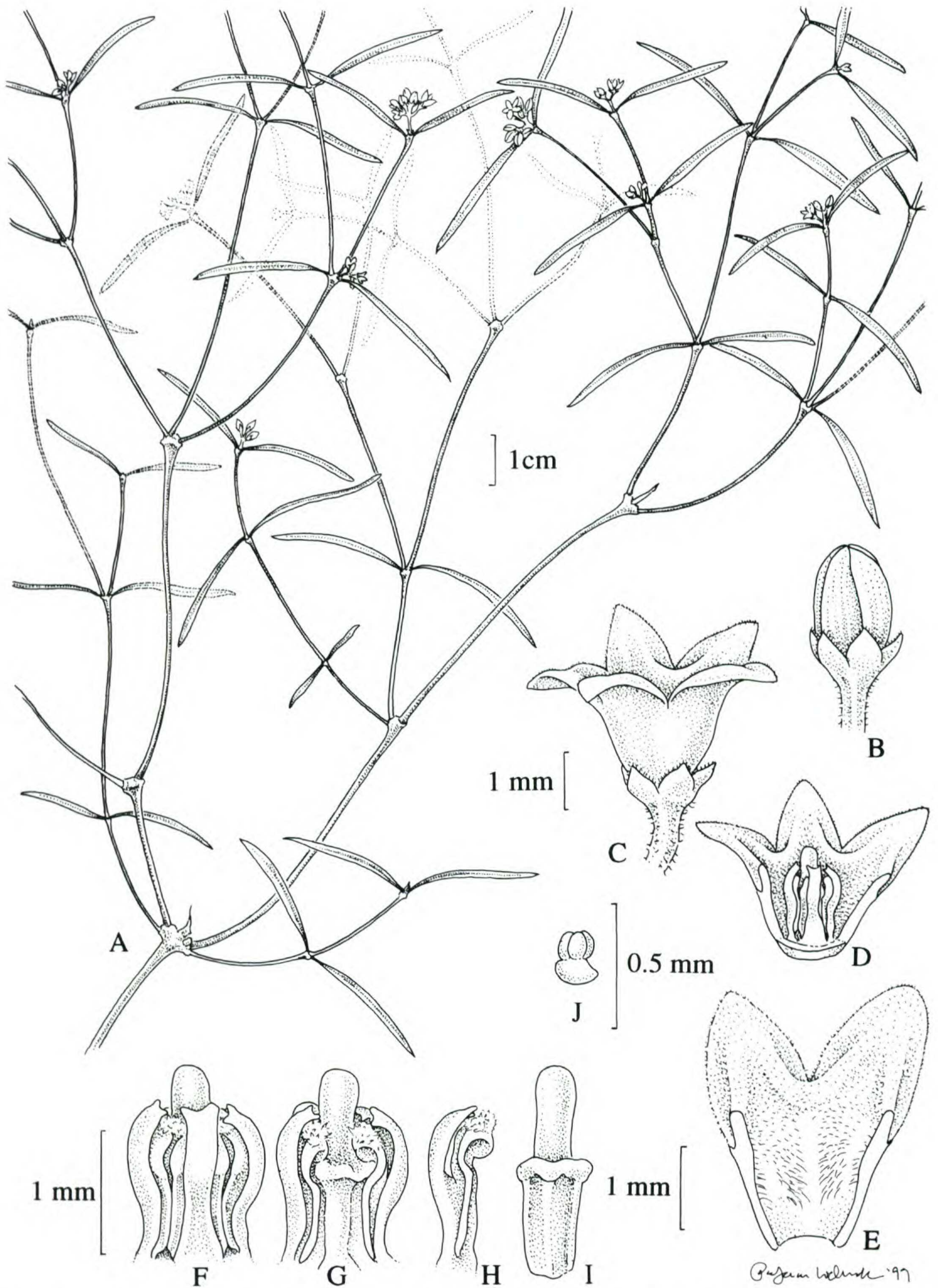


Figure 2. *Secamone linearis* Klackenberg. —A. Habit. —B. Flower in bud. —C. Flower. —D. Gynostegium and portion of corolla. —E. Portion of corolla from within. —F. Gynostegium. —G. Gynostegium with one anther removed. —H. Anther, lateral side. —I. Style head. —J. Pollinarium, lateral side. A–J, *Rasoavimbahoaka et al. 14*. Drawn by Pollyanna Lidmark, Stockholm.



soidal, 0.1–0.15 mm long. Ovary of two separate carpels, subinferior. Style absent. Style head projecting above the staminal column; narrower upper part slightly shorter than the lower broader part, ca. 0.5 mm long, cylindric, entire at the apex. Follicle (only gall-infested one seen) ca.  $2.0 \times 0.8$  cm, narrowly ovoid, straight, glabrous. Seeds not seen.

*Distribution and habitat.* *Secamone linearis* is only known from the type collection from the Marojejy mountains at 1300–1500 m altitude. Habitat unknown. It was collected in flower in January.

*Secamone linearis* from the Marojejy mountains in the northeastern part of Madagascar most resembles *S. sparsiflora* from the Isalo mountains to the southeast. Both species probably represent isolated segregates of the rather common *Secamone tenuifolia*, whose wide distribution lies between *S. linearis* and *S. sparsiflora*. There is, however, a disjunction between *Secamone tenuifolia* and *S. linearis*, as *S. tenuifolia* has not been found north of the Antananarivo area (Klackenberg, 1992: 85), some 500 km south of the Marojejy mountains. Both *Secamone linearis* and *S. sparsiflora* lack the distinctly tuberculate-papillate lower leaf epidermis, but both share with *S. tenuifolia* narrow, usually linear leaves. *Secamone linearis* differs from *S. sparsiflora* by its shorter and hairy pedicels (1–1.5 mm vs. 3.5 mm long and glabrous), its reddish hairy inflorescence axes (vs. glabrous), a twining habit (vs. a shrubby one with erect or spreading branches), as well as by its dorsiventrally flattened and truncate staminal corona lobes (vs. acute to obtuse lobes, dorsally rounded, as seen in *S. sparsiflora* and *S. tenuifolia*). It has tuberculate-papillate inner surfaces of the corolla lobes, like *Secamone glaberrima*, *S. sparsiflora*, and *S. tenuifolia*, but differs from them in that the corolla lobes are not distinctly valvate. In this character it is instead more similar to *Secamone schatzii* in that the lobes become thinner toward the margins and are slightly overlapping each other with their left margins as seen from outside.

The epithet of this species alludes to the narrow leaves.

A key to the eight Malagasy species that constitute the *Secamone tenuifolia* group discussed in the text is presented below, also serving as a character synopsis:

- 1a. Leaves linear to narrowly elliptic.
- 2a. Shrub with erect or spreading branches; in-

- florescences glabrous; pedicels more than 3.5 mm long . . . . . *S. sparsiflora*
- 2b. Twiners; inflorescence axes and pedicels usually pubescent with reddish hairs; pedicels less than 3.5 mm long.
- 3a. Leaf usually with reddish hairs below and with finely and densely tuberculate-papillate epidermis, seemingly powdered (fine-grained) (seen clearly with a lens at  $\times 25$ ); corolla distinctly valvate . . . . . *S. tenuifolia*
- 3b. Leaf almost glabrous with lower epidermis smooth; corolla lobes somewhat contorted with left lobe margins slightly overlapping . . . . . *S. linearis*
- 1b. Leaves elliptic to ovate.
- 4a. Leaves with midrib and primary nerves visible when dry; staminal corona lobes hook-like or sickle-shaped, cylindrical or laterally flattened toward apex.
- 5a. Leaf underneath with smooth epidermis, not tuberculate-papillate; corona lobes hook-like, jutting out at ca.  $90^\circ$  from staminal column . . . . . *S. unciniformis*
- 5b. Leaf underneath with finely and densely tuberculate-papillate epidermis (lens  $\times 25$ ); corona lobes sickle-shaped,  $\pm$  arched over staminal column.
- 6a. Corolla lobes  $> 2$  mm long; corona lobes (free part)  $> 1$  mm long with the apices converging above staminal column, distinctly laterally flattened and sharp-edged at dorsal side, broadened only at the very base below the anther wings . . . . . *S. drepanoloba*
- 6b. Corolla lobes  $< 2$  mm long; corona lobes  $< 1$  mm long and not converging above staminal column, somewhat laterally flattened but dorsally rounded . . . . . *S. dequairei*
- 4b. Leaves with midrib only visible when dry; staminal corona lobes arched but  $\pm$  dorsiventrally flattened toward apex.
- 7a. Corolla lobes  $\pm$  evenly thick to margin and valvate, with inner surface covered with white (when dry) fine papillae; corona lobes longer than staminal column . . . . . *S. glaberrima*
- 7b. Corolla lobes becoming thinner toward margins and with left margins slightly overlapping, not finely papillate; corona lobes  $\pm$  equaling staminal column . . . . . *S. schatzii*

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